Short galvanic currents, not strong enough to move muscles, give, under certain conditions, marked increase of k.-j.

Galvanism to temples especially, but also to other regions of the head, gives large reinforcements to k.-j.

Making circuit is more effectual than breaking, and these effects soon wear out.

The negative pole to temple gives greater and more constant increase of k.-j. than the positive in same position.

There is more effect on k.-j. from pole to temple than over leg-centres. Effect the same for either k.-j.

Galvanism to temples, with violent synchronous muscle acts, very greatly reinforces k.-j.

Long ascending spinal galvanic currents give good increase of k.-j.; descending, far less.

Moderate constant currents to spine do not reinforce k.-j.

The skin-reflexes (cremaster abdominal) are not reinforced by muscle acts or by pain.

When the belly of a muscle is struck, the resulting contraction obeys all the laws of reinforcement which apply to the k.-j. Tension has upon it much the same influence as on k.-j. One muscle jerk does not reinforce another.

The movement caused by electricity seems incapable of reinforcement.

Tension lessens the effect of even quite strong faradic currents as to pain and motion. B. S.

PATHOLOGY (INCLUDING PATHOLOGICAL ANATOMY) OF NERNOUS SYSTEM.

The Histological Changes in Multiple Sclerosis. By M. KÖPPEN. *Arch. f. Psych.*, xvii., 63.

Disseminated sclerosis appears in various parts of the central nervous system without any apparent law governing its local extent. Charcot's statement that the central cortex is exempt from the process is put in doubt by the case reported by Frommann ; and Erb has shown that Buchwald's assertion that the anterior and lateral columns of the cord are the regions chiefly involved is not based on fact. Schlute has held that the process begins in the brain. Putzar, however, holds that it may commence in the cord. The changes which were at first supposed to be limited to small foci are now known to be at least in some cases diffuse. The basis substance of the focus of disease is spoken of as a semi-fluid gray sticky material, as a structureless interstitial material, and as a fibrillary tissue produced by an increase in neuroglia fibres. How the short neuroglia fibres can change into long connective-tissue fibrillæ is not explained. In the focus cells are described of large size with distinct nuclei, the giant cells of Chvostek—supposed to be collections of protoplasm about nuclei already present, and extending themselves outward in branching processes. Spindle-shaped cells are also described in the basis substance and also free nuclei and cells lying in the interstices of the tissue, whose origin is obscure. Emigrated blood-globules are always found. All observers note a thickening of the vessel walls. And from these new formations a process of degeneration in the normal tissue is noticed in the ganglion cells and nerve fibres, as evidence of which are found fat drops, fat crystals, corpora amylacea, and nucleated cells. According to Charcot and Schultze, the nerve fibres lose their medullary sheath while the axis cylinder is not destroyed, but is either swollen or atrophied. The preservation of the axis cylinder explains the absence of secondary degenerations. Other observers have, however, disputed this assertion. The majority of authors agree that multiple sclerosis is a chronic inflammatory process, beginning either in the neuroglia or in the vessel walls.

After this review of previous writers the author proceeds to describe three cases which he has examined by aid of the new staining methods of Weigert and French.

The foci were not sharply limited, but the process faded off into the normal tissue imperceptibly, and was therefore diffuse. In the white substance the basis substance consisted of fine fibrils sharply curved, which were evidently thickened interstitial connective tissue. The vessels were greatly thickened, were tortuous, and were distended with blood. Throughout the foci bodies of shining appearance were found, not connected with the neuroglia fibres, but often lying in the interspaces, and about the same diameter as the axis cylinder. There were naked axis cylinders. No true cellular elements were to be found, nor were Deiter's cells at all prominent. On the periphery of the foci nerve fibres with very thick medullary sheaths were noticed. Near the nerve roots long fibrils of neuroglia were observed running parallel with the nerve fibres, and swollen axis cylinders were also found. In the foci in the gray substance the same network of basis substance and the same naked axis cylinders were seen. The ganglion cells were not affected.

In longitudinal sections it was evident that the basis substance consisted of long straight fibrils, and that the shining bodies were swollen axis cylinders. The axis cylinders were thicker and more swollen in the centre of the focus than at its borders. The medullary substance had at points collected in drops, leaving the cylinder bare at parts between. The cylinders were rarely broken. Such a preservation of the axis cylinders, and such swelling of the cylinders in the midst of sclerotic tissue is found only in multiple disseminated sclerosis, and must be considered characteristic of the lesion. In what relation it stands to the slight degree of paralysis present, the intentional tremor, the excessive reflex action and the other symptoms is undetermined.

The Histological Changes in Spinal Sclerosis. BABINSKI. *Arch. de Physiol. Normal et pathologique*, 1885, p. 186.